June 16, 2022

U. S. Department of Transportation
Docket Management System
1200 New Jersey Ave. SE
Washington, DC 20590

Subject: A-Cam Aerials Petition for Exemption Pursuant to 49 USC Section 44807 to Authorize Aerial Photography and Cinematography Services with UAS Weighing 55 Pounds or More (Amendment)

To Whom It May Concern,

Pursuant to 49 USC Section 44807, A-Cam Aerials LLC. ("A-Cam"), hereby applies for an Amendment of the Grant of Exemption (No. 18966) from the Federal Aviation Regulations ("FARs") identified below to allow to allow A-Cam to operate uncrewed aircraft systems ("UAS") weighing over 55 pounds but no more than 75 pounds, for aerial photography and cinematography operations.

The amendment A-Cam requests is to add the Alta X UAS to the exemption. There has been no change in the conditions and reasons relative to public interest and safety that were the basis for granting the original exemption. The Alta X platform has also been approved under Exemption No. 18594A awarded to Beverly Hills Aerials.

A-Cam also requests that the FAA determine that good cause exists for not publishing a summary of the petition in the Federal Register as the extension of an amendment to the exemption would not set a precedent and any delay in acting on this petition would be detrimental to A-Cam Aerials, LLC.

In support of this Petition for Exemption Amendment, A-Cam can submit the following associated UAS operating documents if so required:

- A-Cam Concept of Operations ("CONOPS")

If submitted, this document will be submitted on a confidential basis under separate cover pursuant to 14 C.F.R. § 11.35(b), as the documents contain confidential commercial and proprietary information that A-Cam has not and will not share with others. The information contained in this material is not generally available to the public and is protected from release under the Freedom of Information Act, 5 U.S.C. § 552 *et seq*.

In accordance with 14 C.F.R. § 11.81(a), the contact information for Petitioner is as follows:

A-Cam Aerials, LLC
c/o: Thomas Kenji Sugahara
PO Box 5046

Salem, OR 97304

I. Description of UAS

A-Cam has multiple airframes that it is currently utilizing or planning to utilize for aerial cinematography operations. The dimensions and physical characteristics of the Freefly Alta-X UAS are as follows:

**Freefly Alta-X**
Flight Controller: PX4 based on 1.9 running on a Cube Black (referred to as PX4 in all documents)
Manufacturer: Freefly Systems
Utilization: This is the airframe that A-Cam is currently conducting aerial cinematography operations with.
Airframe type: Quadcopter Multirotor
Airframe weight: 22.9 pounds
MTOW: 76.9 pounds
Motors: 4x DJI E7000 motors with a total combined max thrust of 186 pounds (Hobbywing X9 motors will have a combined max thrust of 169 pounds)
AUW: Less than 55 pounds. Payload and batteries changed to stay under 55 pounds per Part 107.
Wheelbase: 55.7 inches, rotor to rotor

The following components and safety systems are standard:

PX4 1.9 based flight controller on a Cube Black– Introduced in 2009, the PX4 autopilot is one of the industry standard flight controllers for heavy lift UAS. A mature product, the cube platform has thousands of hours of flight time. PX4 is one of the world's leading autopilot systems.

The PX4 autopilot installed in the Alta-X has a triple redundant, temperature controlled, 3-axis inertial measurement system with 2 sets being mechanically vibration isolated; a GNSS and magnetometer (compass) network; and a barometric pressure sensor for detecting aircraft altitude.

DJI E7000 Electronic Speed Controllers – Spark proof circuitry extends life of connectors and makes them more reliable. A back up throttle system automatically activates if the primary throttle line is interrupted. (This petition also covers a new revision of the Alta X that utilizes the Hobbywing X9 Motors)

Frsky HORUS X10 with RFD900 – aircraft controls are transmitted using 900 Mhz technology. A high-speed processor chooses the best channel and bandwidth for both aircraft controls based on distance and electromagnetic environment. The RFD900 provides additional telemetry that provides real-time information such as battery voltage and cell voltage.

FPV Camera – a first-person view camera is mounted on the Alta-X to allow the RPIC to view what is in front of the UAS independent of the feed from the payload camera. This augments the tripod mounted ground station tablet to supplement awareness of the RPIC.

ALTA QGroundControl Software – The QGroundControl ground station software has been in use since 2009 having gone through multiple versions which have increased stability and functionality. QGroundControl allows users to input maximum distances and maximum altitudes that the UAS can fly from the take-off location. Telemetry is provided real-time to the ground station including location altitude, speed, distance from take-off location, heading, battery voltage, flight mode, GPS lock, control and data signal strength, and other information.

Geofencing – QGroundControl's geofencing prevents the exit of a predefined area and/or altitude. When enabled, the UAS will not exit a geo-fenced area even with manual or automatic inputs by the RPIC.

Emergency flight termination – The PX4 flight controller enables emergency flight termination using a controller sequence that cuts power to all motors. The Alta X will also have a separate Flight Termination System operating on a frequency band separate from the operating frequency of the C2 link.

Return to Home (RTH) – the PX4 controller supports RTH or immediate land through a controller sequence or when control signal is lost by the UA. If RTH is enabled, QGroundControl allows the setting of a RTH altitude.

## II. Regulations from which Exemption is Sought

A-Cam seeks an exemption from the following interrelated provision of CFR Parts 61 and 91:

| FAR | Description |
|---|---|
| **§61.3(a)(1)(i)** | **Pilot Certificate** |
| **§91.7(a)** | **Civil aircraft airworthiness** |
| **§91.109(a)** | **Dual Controls** |
| **§91.119(c)** | **Minimum safe altitudes: General.** |
| **§91.121** | **Altimeter settings.** |
| **§91.151(b)** | **Fuel requirements for flight in VFR conditions.** |
| **§91.403(b)** | **Maintenance** |
| **§91.405(a)** | **Maintenance required.** |
| **§91.407(a)(1)** | **Operation after maintenance, preventative maintenance, rebuilding, and inspections.** |
| **§91.409(a)(1) and (a)(2)** | **Inspections** |
| **§91.417(a) and (b)** | **Maintenance records.** |

Listed below are the specific Federal Aviation Regulations ("FAR") sections from which an exemption is sought, the rationale for why an exemption is needed, and a brief summary of the operating procedures and safeguards, which are described more fully in the operating documents being submitted under separate cover, which will ensure that the proposed operations can be conducted at a level of safety that is at least equal to that provided by the rule from which exemption is sought. For ease of review, this section divides the FARs from which exemption is sought into two main categories: (1) FARs pertaining to the UAS, and; (2) FARs pertaining to UAS Operating Parameters.

To expedite the FAA's safety assessment of the proposed UAS operations, except where explicitly noted in the CONOPS, A-Cam agrees to conduct the proposed operations in accordance with the same applicable conditions and limitations ("Limitations") included in the original exemption. The only difference is the approved UAS.

### A. FARs Pertaining to the Uncrewed Aircraft System

**§91.403(b) Maintenance**
**§ 91.405(a) and (b) Maintenance required**
**§ 91.407(a)(1) Operation after maintenance, preventive maintenance, rebuilding, or alteration**
**§ 91.409(a)(1) and (2) Inspections**
**§ 91.417(a) and (b) Maintenance records.**
**§91.109(a) Dual Controls**

A-Cam seeks an exemption from the following maintenance and inspection-related FARs: §§ 91.403(b) *Who may perform maintenance*, 91.405(a) *Maintenance required*, 91.407(a)(1) *Operation after maintenance, preventive maintenance, rebuilding, or alteration*, 91.409(a)(1) and (2) *Inspections*, and 91.417(a) and (b) *Maintenance records*. These regulations specify maintenance, inspection, and records standards in reference to FAR § 43.6. An exemption from these regulations is needed because Part 43 and these sections only apply to aircraft with an airworthiness certificate, which the UAS to be operated under this exemption will not have, and because compliance with these regulatory provisions in the context of UAS operations is not feasible.

An equivalent level of safety will be achieved because maintenance, inspections, and records handling will be performed in accordance with the manufacturer's manual, any required manufacturer safety or service bulletins, and the A-Cam Exemption Limitations. Under the Limitations, for example, the PIC will conduct a pre-flight inspection of the UAS and all associated equipment to account for all discrepancies and/or inoperable components.

Maintenance will be performed and verified to address any conditions potentially affecting the safe operation of the UAS, and no flights will occur unless and until all flight critical components of the UAS have been found to be airworthy and in a condition for safe operation. A functional test flight will also be conducted in a controlled environment following the replacement of any

flight critical components, and, as required by the operating documents, the PIC who conducts the functional test flight will make an entry in the UAS aircraft records of the flight. Functional flight tests will not involve the carriage of hazardous materials and the vehicle will have an all-together weight below 55 pounds during flight testing. In addition, the operator will be required to follow the UAS manufacturer's maintenance, overhaul, replacement, inspection, and life limit requirements for the UAS and its components. Along with the preflight checklists, A-Cam Pilot Training Program, and a routine maintenance program, A-Cam believes an equivalent level of safety is met, and that equipment at risk of failure can be safely identified before flights occur.

Maintenance, preventive maintenance, rebuilding, and alterations will be performed by A-Cam using the methods, techniques, and practices prescribed in the current manufacturers' maintenance manuals. This maintenance will be performed by qualified individuals whom the manufacturer has trained in proper techniques and procedures for these UAS, as described in their applicable operating documents. The operator will record all maintenance performed on the aircraft, including a brief description of the work performed, date of completion and the name of the person performing the work. A-Cam personnel who have received maintenance training and signoff authority from the manufacturer, including all A-Cam pilots who operate the Alta X, will conduct simple prescribed maintenance, preventive maintenance and replacement. Major, difficult or complex maintenance, preventive maintenance, and alterations may be performed in consultation with Freefly or by the manufacturer itself.

In the original exemption, the FAA determined that the proposed UAS operations required exemption from FAR §§ 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b), and that the achievement of an adequate level of safety required certain conditions and limitations. A-Cam has proposed in this Petition a number of Limitations related to maintenance, inspections, and records which it believes provide a level of safety at least equivalent to that provided by FAR §§ 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b). For this reason, and consistent with the exemption granted from these sections in the original exemption, A-Cam requests an exemption from these sections subject to the original exemption limitations, without having to perform the inspections and maintenance items required by FAR §§ 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), and 91.417(a) and (b).

### B. FARs Pertaining to Uncrewed Aircraft System Operating Parameters

§ 91.7(a) Civil aircraft airworthiness

Inasmuch as there will be no airworthiness certificate issued for the UAS, A-Cam seeks an exemption from FAR § 91.7(a) Civil aircraft airworthiness, which requires that a civil aircraft be in an airworthy condition to be operated. While the UAS operated by A-Cam will not have an airworthiness certificate, consistent with the FAA's determination in the A-Cam Exemption, the pilot may determine the UA is in an airworthy condition prior to flight. As described more fully in the operating documents, this is achieved through adherence to A-Cam's routine pre-flight

checklist regularly scheduled maintenance, and the enhanced pilot training requirements of the A-Cam Pilot Training Program.

§ 91.119(c) Minimum safe altitudes

A-Cam also seeks an exemption from FAR § 91.119(c) Minimum safe altitudes, to the extent necessary to allow UAS operations over closed set or sparsely populated areas at altitudes lower than those permitted by rule. The ability to operate at those altitudes is one of the key benefits of using UAS for the proposed activities. An equivalent or greater level of safety will be achieved given the size, relatively light weight, and slow speed of the UAS, as well as the controlled location where the operations will occur.

As described in the operating documents, A-Cam operations will be limited to 400 feet AGL or otherwise authorized by a COA issued by ATO. In the closed set or sparsely populated environments where A-Cam operations occur, flying at or below authorized altitudes increases the aircraft's efficiency, without posing any increased risk to people or property. Even at these low altitudes, A-Cam's UAS operations will be conducted at a level of safety equal to or greater than that achieved by a larger traditional aircraft performing similar activities at the altitudes required by FAR § 91.119.

§ 91.121 Altimeter settings

A-CAam also requests an exemption from FAR § 91.121 Altimeter settings, which requires a person operating an aircraft to maintain cruising altitude or flight level by reference to an altimeter that is set to the elevation of the departure airport or barometric pressure. In the A-Cam Exemption, the FAA stated that an equivalent level of safety to the requirements of FAR § 91.121 can be achieved in circumstances where the PIC uses an alternative means for measuring and reporting UA altitude, such as global positioning system (GPS). The UAS that A-Cam intends to use for performing the proposed operations will be equipped with GPS or other equipment for measuring and reporting UAS altitude, and the PIC will check the UA altitude reading prior to each takeoff, effectively zeroing the UA's altitude at that point. Consistent with previously granted exemptions, these requirements ensure that an equivalent level of safety will be achieved, and an exemption from the requirements of FAR § 91.121 is therefore appropriate.

§ 91.151(b), Fuel requirements for flight in VFR conditions

Finally, A-Cam seeks an exemption from FAR § 91.151(b) Fuel requirements for flight in VFR conditions, which would otherwise require a 20-minute fuel reserve to be maintained. The FAA has previously determined that a requirement prohibiting the PIC from beginning a UAS flight unless (considering wind and forecast weather conditions) there was enough available power for UAS to operate for the intended operational time and to operate after that for at least five minutes or with the reserve power recommended by the manufacturer if greater would ensure an equivalent level of safety to the fuel requirements of FAR § 91.151. See the A-Cam

Exemption at pg. 15. A-Cam will adhere to the same reserve power requirement and an exemption from FAR § 91.151's fuel requirements for flight in VFR conditions is therefore appropriate.

## III. Pilot Certification

As previously noted, the proposed operations under this exemption request are similar to those authorized in the A-Cam Exemption. The first similarity revolves around the issue of pilot certification. Before the A-Cam Exemption, which was granted after the creation of the remote pilot airman certificate, the PIC was required to hold either an airline transport, commercial, private, recreational, or sport pilot certificate. Prior to Part 107 becoming effective, this traditional pilot certification requirement was imposed on all UAS operators conducting operations under Section 333 Exemptions because of the statutory requirement in 49 U.S.C. 44711(a)(2)(A) that prohibited a person from serving in any capacity as an airman on a civil aircraft being operated in air commerce without an airman certificate.

Part 107 created a new class of airman certificate tailored to remote pilots (the remote pilot airman certificate). With the creation of this new class of airman certificate, the FAA is no longer bound by the statutory requirement in 49 U.S.C. 44711(a)(2)(A) to require a PIC to hold either an airline transport, commercial, private, recreational, or sport pilot certificate. Instead, the FAA can require that A-Cam's PIC hold a remote pilot airman certificate, as was done in the A-Cam Exemption, if doing so would not adversely affect safety.

In the Preamble to Part 107, the FAA explained its analysis as to why the certification requirements for traditional aircraft operations are neither necessary, nor appropriate for small UAS flight operations:

> Additionally, under current pilot certification regulations, depending on the type of operation, the remote pilot in command of the small UAS currently must obtain a sport, recreation, private, commercial, or airline transport pilot certificate. . . . While these airman certification requirements are necessary for traditional aircraft operations, they impose an unnecessary burden for many small UAS pilots because a person obtains a pilot certificate under part 61 by learning how to operate a manned aircraft. Much of that aeronautical experience/flight training is not applicable to small UAS operations because a small UAS is operated differently than a manned aircraft. In addition, the aeronautical/flight experience currently necessary to obtain a pilot certificate under part 61 does not equip the certificate holder with all of the tools necessary to safely pilot a small UAS. Specifically, applicants for a pilot certificate under part 61 currently are not trained in how to deal with those aspects of "see-and- avoid" and loss-of-positive-control safety issues that are unique to small uncrewed aircraft. Thus, requiring persons wishing to operate a small UAS to obtain a pilot certificate under part 61 imposes the cost of airman certification on those persons, but does not result in a significant safety benefit because the process of obtaining the certificate does not equip

those persons with all of the tools necessary to mitigate the public risk posed by small UAS operations.[5]

For the reasons discussed below, this same rationale espoused by the FAA in the Preamble to Part 107, combined with A-Cam's proposed safety mitigations, also supports, as in the A-Cam Exemption, a finding that the proposed operations under the requested exemptions can be conducted without adversely affecting safety.

As in the A-Cam Exemption, A-Cam operations will be conducted under 14 CFR part 91 rather than under Part 107. While the operations would be conducted under Part 91, A-Cam proposes that operations would fall under the privileges of a remote pilot in command if this exemption is granted.

While it is true that operations involving UAS weighing 55 pounds or more could raise additional safety concerns than operations involving small UAS, the unique nature of the proposed operations, including the low-risk environments in which the operations will occur, will ensure that safety is not jeopardized. While Part 107 will not apply to the proposed operations, wherever possible, A-Cam intends to conduct the proposed operations in accordance with Part 107. In addition to compliance with Part 107, A-Cam's proposed operations include the following mitigations:

- PIC would hold at least a second-class medical certificate to ensure the pilot does not have any physical or mental conditions that would interfere with the safe operation of the UAS. Additionally, PICs of operations would be prohibited from operations during medical deficiency as prescribed in § 61.53(a), and VOs and other UAS crewmembers would be prohibited from operations during medical deficiency as prescribed in § 61.56(b).
- Following that, all state and local paperwork associated with the operation will be filed before and after operations. At 72 hours before aerial filming, A-Cam will submit a Plan of Activities to the local Flight Standards District Office with jurisdiction over the area of proposed filming. The contents of the Plan of Activities is as set forth on pages 38-39 of the A-Cam Exemption.
- The PIC will hold a Part 107 remote pilot airman certificate.
- Prior to beginning operations, the PIC will take all preflight actions as set forth in its flight manual, which includes a comprehensive preflight checklist. Such actions would include reviewing weather, flight battery requirements, landings, and takeoff distances and aircraft performance data before initiation of flight. The operations would comply with visibility requirements and adherence to minimum distances from clouds. Such requirements ensure the uncrewed aircraft does not operate so close to a cloud as to create a hazard to other aircraft operating in the NAS. The pilot in command would also account for all relevant site-specific conditions in his or her preflight procedures.

[5] 81 FR 42069 (June 28, 2016).

- At least one visual observer (VO) will be used for all operations. Both the PIC and VO will maintain a safe distance from the UAS when it is operating as set forth in its flight manual.
- The areas to be flown are closed sets or sparsely populated areas. PIC will first conduct a remote assessment of the flight area. Prior to operations, the PIC and primary VO will conduct a walkthrough of the operating area to the maximum extent possible to ensure lines of sight are clear, marking obstructions, and ensuring visual observers have unobstructed fields of view.
- UAS flights will be limited to a maximum altitude of 400 feet above ground level (AGL) or an altitude authorized by a COA issued by ATO.
- Visual observers and security will ensure the area of operation is clear of all non-participants and any other potential hazards, prior to beginning operations (with UAS weighing 55 pounds or more).
- A small UAS may be used to survey and access the operating environment prior to operations if permitted.

A. A-Cam's Enhanced Pilot Training and Experience Standards

Through its training program, which requires aeronautical knowledge, experience, and flight proficiency beyond that required by Part 107, A-Cam will be able to achieve a level of safety equivalent to what would be obtained using a PIC holding an uncrewed pilot certificate under Part 61.

As with the proponents in the A-Cam Exemption, A-Cam has integrated safety elements into the operation of its UAS, including comprehensive pilot and VO training and certification requirements that establish an equivalent level of safety to operations conducted with a PIC that holds an uncrewed pilot certificate. These requirements include: a comprehensive UAS training course, which includes theory and practical components, a pilot theory exam, supervised flight training, completion of A-Cam's training and examination program requirements, minimum flight time requirements, demonstrated practical flying ability for the relevant tasks, and continued periodic training after certification.

***Aeronautical Knowledge***

The following chart addresses each aeronautical knowledge requirement of § 61.125 and explains whether it is relevant to, different from, or addressed by Part 107 operations or A-Cam internal procedures.

| **§61.125, Aeronautical Knowledge** | **A-Cam Operations Under Part 107** |
|---|---|
| (1) Applicable Federal Aviation Regulations of this chapter that relate to commercial pilot privileges, limitations, and flight operations; | Addressed by Part 107 |
| (2) Accident Reporting | Addressed by Part 107 |

| | |
|---|---|
| (3) Basic aerodynamics and the principles of flight | Topics applicable to uncrewed aircraft are included in Part 107. |
| (4) Meteorology | Applicable meteorology principles are covered by Part 107. |
| (5) Safe and Efficient Operation of Aircraft | Covered by Part 107 and included in A-Cam training. |
| (6) Weight and Balance | "Loading and Performance" is addressed by Part 107. A-Cam will comply with the weight limitation exemption and will ensure that external loads do not negatively impact flight characteristics, as required by Part 107. |
| (7) Performance Charts | Not directly applicable. |
| (8) Effects of exceeding aircraft performance limitations | Not directly applicable. Topics applicable to uncrewed aircraft are included in Part 107. |
| (9) Pilotage and dead reckoning | Not applicable. |
| (10) Use of air navigation facilities | Topics applicable to uncrewed aircraft are included in Part 107. |
| (11) Decision making and judgment | Addressed by Part 107 |
| (12) Principles and functions aircraft systems | Covered by Part 107 and by A-Cam internal procedures and use of operations manuals |
| (13) Emergency operations | Addressed by Part 107 and by A-Cam Emergency Response Procedures. |
| (14) Night and high altitude | High altitude not applicable. Night covered by waiver. |
| (15) Operating within the national airspace system. | Addressed by Part 107 |
| (16) Lighter than air ratings. | Not applicable. |

***Flight Proficiency***

FAR § 61.127 contains flight proficiency requirements for specified aircraft categories. Part 107 contains no flight proficiency requirements, however to ensure adequate flight proficiency, A-Cam will require demonstrated multi-rotor proficiency in:

- Preflight preparation;
- Preflight procedures;
- Airport and heliport operations;
- Hovering maneuvers;
- Takeoffs, landings, and go-arounds;
- Performance maneuvers;
- Navigation;
- Emergency operations;
- Special operations; and
- Postflight procedures.

***Aeronautical Experience***

FAR § 61.129 contains requirements for aeronautical experience that are not required for operations conducted under Part 107. To ensure an adequate level of aeronautical experience, A-Cam will require its pilots to obtain an appropriate level of aeronautical experience, using § 61.129 as a guide, where applicable and reasonable. Many of the requirements § 61.129, however, are either inapplicable or excessive for A-Cam's proposed operations. Commercial helicopter ratings require at least 150 hours of flight time. Much of this, however, need not be in a helicopter or as the PIC. Other flight time requirements in Part 61 are cross-country time or instrument time. There is no need for Part 107 remote pilots to obtain time spent in cross-country flight or instrument flight. A-Cam pilots will spend all of their time flying the make and model of multi-rotor aircraft that will be used in their operations. These aircraft are far less complicated than traditional aircraft. The pilots can, therefore, achieve a comparable level of experience and safety by requiring 100 hours of total flight time of a multi-rotor system as the PIC with at least 10 take-off and landings. This will be required by the operations manual and training program.

## IV. Environmental Analysis

A-Cam is already conducting operations using the specified UAS under Part 107. The only difference between current operations and operations under this exemption will be the AUW of the aircraft. Operations occur in many different locations, many potential impacts are already regulated by other Federal statutes, and the UAS uses an electrical powerplant. As noted in FAA-2018-1087-0971, Final Rule allowing Operation of Small Unmanned Aircraft Systems Over People and at Night, Documentation Supporting Application of Categorical Exclusion,

> [T]he proposed action will not involve land acquisition; physical changes to the environment resulting from ground disturbance or construction activities; changes in patterns of population movement or growth, increases in public service demands, or business and economic activity; or generation, disturbance, transportation, or treatment of hazardous materials.

Likewise, this application as envisaged by this petition will not involve any impacts as outlined in FAA-2018-1087-0971. We request that the FAA apply a categorical exclusion to the proposed operations.

## V. Federal Register Summary

Pursuant to 14 C.F.R. Part 11, the following summary is provided for publication in the FEDERAL REGISTER, should it be determined that publication is needed:

Petitioner seeks an exemption from the following rules in Title 14 of the Code of Federal Regulations:

61.3 (a)(1), 91.7(a), 91.109(a), 91.119(c), 91.121, 91.151(b), 91.403(b), 91.405(a), 91.407(a)(1), 91.409(a)(1) and (2), 91.417(a) and (b).

## VI. Conclusion

For the foregoing reasons, A-Cam respectfully requests that the FAA grant this Amendment to Exemption 18966. Should you have any questions, or if you need additional information to support A-Cam's Petition for Amendment, please do not hesitate to contact the undersigned.

Sincerely,

Thomas Kenji Sugahara
On behalf of A-Cam Aerials, LLC